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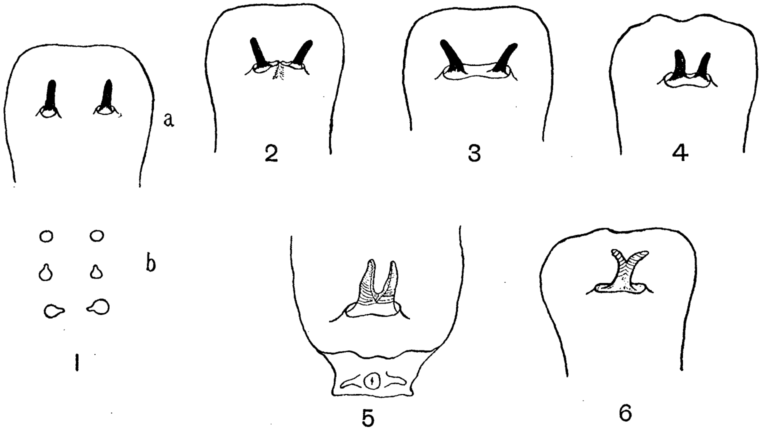
FUSION OF "RHINOPHORES" IN CHROMODORIS[1]

THERE have been found during the present spring nine specimens of the nudibranch *Chromodoris zebra* Heilprin which form a series exhibiting an interesting gradation in the degree of coalescence of the "rhinophores." The animals were each of average adult size, 10–12 cm. in length. In none of these cases was there any evidence that the structural variations had resulted from injury. In the period over which these individuals were obtained there were also collected about 1,000 normal specimens of the same species. These figures give, however, no precise idea of the relative frequency of "rhinophore" variation, because a larger number of specimens had been collected in previous years without any occurrence of these variations being observed.



FIGS. 1–6. Outlines of anterior ends of *Chromodoris zebra* Heilprin, showing increasing degrees of fusion of the "rhinophores." Fig. 5, frontal view; the rest, dorsal aspects. Fig. 1a, the normal condition; Fig. 1b, variation in the edges of the "rhinophoral" collars of three individuals.

The bases of the two "rhinophores" of *C. zebra* are, as in other Dorids, normally surrounded by well developed individual cylindrical collars. The distal termination of a collar is usually circular in outline, but occasionally pointed at one side (Fig. 1). In two specimens the "rhinophoral" collars were closely approximated, after the fashion outlined in Fig. 2. Three specimens were found in which the "rhinophoral" collars, and the depressions into which the "rhinophores" are separately retracted when stimulated, had completely fused (Fig. 3). In

[1] Contributions from the Bermuda Biological Station for Research, No. 75.

these animals the two "rhinophores" themselves were separated by their normal distance of about 1 cm. The next step in "rhinophore" fusion is illustrated in Fig. 4, one example having been collected. In another specimen the "rhinophores" were found to be closely united at the base (Fig. 5), while in the remaining two specimens that exhibit fusion of the "rhinophores" (Fig. 6) the process of coalescence had been pushed much further, a single stalk, giving rise at its free end to two short diverging projections, representing the normal pair of "rhinophores."

When a "rhinophore" of *C. zebra* is locally stimulated by being touched, it is retracted within its pocket, the basal collar usually contracting over it, while the companion "rhinophore" on the other side of the animal is usually not contracted. In other words, the "rhinophores" are, with reference to their retraction, subject to independent bilateral control. The process of retracting the "rhinophore" consists of two phases—the "rhinophore" is itself contractile, and it is in addition pulled down into its pocket by the action of muscles situated at its base. With the fused "rhinophores," even in such cases as that illustrated in Fig. 6, the independent bilateral control of the organs is preserved. If one tip be stimulated, that side of the compound "rhinophore" is contracted, the other (unless the stimulation be severe) remaining inert. Under slightly stronger stimulation applied to one tip of a compound "rhinophore," the contraction of the organ itself is immediately followed by the traction of muscles upon the same side of the base of the double "rhinophore," resulting in a bending of the whole structure toward the point of excitation.

The reactions of the abnormal specimens therefore support the view that these abnormal "rhinophores" have been produced by a process of fusion, probably resulting from the original close approximation of "rhinophoral" Anlagen. Two cases have been available for experiment in which one of the normally placed "rhinophores" possessed a divided tip; these divided-tip "rhinophores," superficially not unlike the single median structure above described, gave no evidence of independent control for the two tips, both parts contracting together when one tip was irritated.

It would appear that the development of the collar surrounding the base of the "rhinophore" is directly dependent upon the growth of the latter structure; in every case there was a close correspondence between the bulk of the "rhinophores" and the dimensions of the collar or collars.

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NOTE ON THE HABITAT OF GEONEMERTES AGRICOLA[1]

THE terrestrial nemerteans include a small number of species, all belonging, apparently, to one genus, but widely scattered over the world. They occur conspicuously on islands, some of which are well removed from any large mainland. The origin of these land nemerteans is a matter of some interest, and several suggestions have been made relative to the manner of their evolution. One of these terrestrial nemerteans, *Geonemertes agricola* (W.-S.), was found at Bermuda by v. Willemoes-Suhm (1874). The anatomy of this species was subsequently described in detail by Coe (1904), who gave some attention, also, to the habits of the worm. These observers, as well as Verrill (1902), agree that *G. agricola* is to be found "only along the shores of mangrove swamps and on the adjacent hillsides" (Coe, p. 566). Coe found it "not only above high-water mark but also for some distance along a zone which is covered for a short time each day with sea water," but noted that the intertidal individuals were "as a rule smaller than those living in the soil which is a little above the reach of the tide, but in earth which is nearly saturated with salt water."

Standing bodies of fresh water are absent in Bermuda. Coe consequently held that this particular species, at least, represents a land nemertean which has almost certainly been derived directly from a marine ancestor, and not, as Montgomery (1895, p. 483) had argued for the generality of land nemerteans, from a fresh-water form.

During the past several years I have repeatedly encountered *G. agricola* in a type of habitat which is significantly different from that recorded for this nemertean by the observers just quoted. In the neighborhood of every large or small mangrove "creek" or swamp which I have examined, the worm has been found, in relatively considerable quantities, well below low-water mark even at spring tides. The species occurs in the localities

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[1] Contributions from the Bermuda Biological Station for Research, No. 76.